

Roll No.....

Total No. of Questions : 22]

[Total No. of Printed Pages : 8

11thARNKD(W/Z) JKLUT-2025

1208-A PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

Note:- "Attempt any 60 Marks out of 70 Marks".

SECTION-A

(Objective Type Questions)

(1 mark each)

1. (i) The number of significant figure in 2.64×10^{24} Kg is:
- (a) 3
 - (b) 4
 - (c) 24
 - (d) 1

- (ii) The correct relation between Light year and metre is:
- (a) 1 Light year = 7.469×10^{15} m
 - (b) 1 Light year = 4.2 m
 - (c) 1 Light year = 9.467×10^{15} m
 - (d) None of them
- (iii) At what point in its trajectory does a projectile have minimum upward speed.
- (a) At the start of the Trajectory
 - (b) At the end of the Trajectory
 - (c) At the midpoint of the Trajectory
 - (d) At the highest point in its Trajectory
- (iv) Momentum is measured in :
- (a) Kgsm s^{-1}
 - (b) Kgm s^{-2}
 - (c) Kgm s
 - (d) Kgm

(v) A needle floats on the surface of water because of :

- (a) Lighter weight
- (b) Surface tension
- (c) Adhesive force
- (d) Viscosity

(vi) The meniscus of mercury in a glass tube is:

- (a) Concave upward
- (b) Convex upward
- (c) Plane
- (d) None of the above

(vii) The work done in an isothermal expansion of a gas depends upon:

- (a) Temperature only
- (b) Expansion ratio only
- (c) Both of them
- (d) None of them

(viii) On the basis of absolute zero as the scale of temperature, the ice melts at:

- (a) 100°
- (b) 273.15 K
- (c) 373.15 K
- (d) None of them

(ix) Two vessels A and B of the same size are at the same temperature, one of them holds 1Kg of H_2 gas and the other hold 1Kg of N_2 gas. Which of the vessels contains more molecules?

- (a) A only
- (b) B only
- (c) Both (a) and (b)
- (d) None of them

[5]

(x) The relation between pressure and energy is:

(a) $P = \frac{2}{3} E$

(b) $P = \frac{3}{2} E$

(c) $E = \frac{1}{2} \rho c^2$

(d) None of them

SECTION-B

(Very Short Answer Type Questions)

(2 marks each)

2. Define angular momentum. Give its unit and dimensional formula.
3. Write the comparison of translational and rotational motion.
4. State the physical significance of moment of inertia.
5. Define surface energy. Write relation between surface tension and surface energy.
6. Is a reversible process really possible in practice? Discuss briefly.

What are cyclic and non-cyclic processes?

8. Write down the four assumptions of Kinetic theory of gasses.
9. Write down the expression for the pressure of a gas in terms of density.
10. What is meant by restoring force and force constant?

SECTION-C

(Short Answer Type Questions)

(3 marks each)

11. Write the uses and limitations of the dimensional analysis.
12. Derive an equation of trajectory of projectile fired at an angle.
13. A cricket ball is rolled on ice with a velocity of 5.6 m/s and comes to rest after travelling 8 metre. Find the coefficient of friction. ($g = 9.8 \text{ m/s}^2$).
14. State Newton's first and second laws of motion, also define one Newton of force.

15. A body of mass 10 kg initially at rest is subjected to a force of 40 N. What is the kinetic energy acquired by the body at the end of 10 sec?
16. Distinguish between elastic and inelastic collisions.
17. At what height above earth's surface, value of "g" is same as in a 100 km deep mine? <https://www.jkboseonline.com>
18. Find an expression for the gravitational potential energy of a body situated at a distance "r" from the centre of earth.
19. At what distance from the mean position is kinetic energy equal to potential energy? Briefly explain in case of S.H.M.

SECTION-D

(Long Answer Type Questions)

(5 marks each)

20. What do you mean by resolution of a vector? Find rectangular components of a vector.

[8]

OR

From the velocity-time graph of uniform accelerated motion, deduce the equations of motion in

- (i) Velocity and time (ii) Position and time

21. What do you mean by terminal velocity? Derive an expression for it.

OR

Explain modes of transfer of heat with example.

22. Discuss the harmonics in the case of open end organ pipes.

OR

Derive an expression for velocity and acceleration of a particle executing simple harmonic motion.

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Total No. of Questions : 22]

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11thARNKD(W/Z) JKLUT-2025

1208-C PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

Note:- “Attempt any 60 Marks out of 70 Marks”.

SECTION-A

(Objective Type Questions)

(1 mark each)

1. (i) The number of significant figure in 6.032 Nm^{-2} is:

(a) 6

(b) 3

(c) 2

 (d) 4

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Turn Over

(ii) The correct relationship between Calorie and Joule is:

- (a) 1 Calorie = 4.2 Joules
- (b) 1 Calorie = $\frac{1}{4.2}$ Joules
- (c) 0.24 Calorie = 1 Joule
- ~~(d)~~ Both (a) and (c)

(iii) The horizontal range covered by the projectile is proportional to:

- (a) Its velocity
- (b) Square of the velocity
- ~~(c)~~ Sine of angle of projection
- (d) Square of sine of angle of projection

(iv) A rocket works on the principle of conservation of :

- (a) Linear momentum
- (b) Angular momentum
- (c) Charge
- ~~(d)~~ Force

(v) The normal circulation of blood through our arteries and veins depend on:

- ~~(a)~~ Surface tension
- (b) Capillarity
- (c) Viscosity of blood
- (d) None of them

(vi) Legible writing on a newspaper with a fountain pen is difficult because of:

- (a) Inertia
- (b) Elasticity
- (c) Capillary action
- (d) Surface Tension

(vii) The relation of an adiabatic change is:

- (a) $Pv = \text{constant}$
- ~~(b)~~ $Pv^r = \text{constant}$
- (c) $Pv = RT$
- (d) None of them

(viii) Two systems are said to be in thermal equilibrium if they have the same:

- ☒ (a) Pressure
- (b) Volume
- (c) Temperature
- (d) None of them

(ix) Two vessels A and B of the same size are at the same temperature, one of them holds 1Kg of H_2 gas and the other holds 1Kg of N_2 gas. Which of the vessels contains more molecules?

- (a) A only
- (b) B only
- ☒ (c) Both (a) and (b)
- (d) None of them

- (x) The expression for the pressure exerted by a gas in terms of density is:

(a) $\frac{1}{3} \frac{mNc^2}{V}$

(b) $\frac{1}{2} \frac{mNc^2}{V}$

(c) $\frac{1}{3} \rho c^2$

(d) $\frac{1}{3} \frac{\rho c^2}{V}$

SECTION-B

(Very short Answer Type Questions)

(2 marks each)

2. State and establish the conservation law of angular momentum.
3. Write the equation for momentum, and work done in rotational motion.
4. State the differences between Mass and Moment of inertia. (any two)
5. Obtain the dimensions and units of coefficient of viscosity.
6. What do you mean by reversible process? Give example.

7. What are cyclic and non-cyclic processes?
8. Write down the four assumptions of Kinetic theory of gases.
9. What is meant by degree of freedom? Write down the degree of freedom of diatomic gas molecule.
10. What is meant by restoring force and force constant?

SECTION-C

(Short Answer Type Questions)

(3 marks each)

11. Write the uses and limitations of the dimensional analysis.
<https://www.jkboseonline.com>
12. Derive an equation of trajectory of a projectile fired at an angle.
13. A cricket ball is rolled on ice with a velocity of 5.6 m/s and comes to rest after travelling 8 metre. Find the coefficient of friction. ($g = 9.8 \text{ m/s}^2$).
14. State Newton's first and second laws of motion, also define one Newton of force.

15. A body of mass 10 kg initially at rest is subjected to a force of 40 N. What is the kinetic energy acquired by the body at the end of 10 sec?
16. Distinguish between elastic and inelastic collisions.
17. At what height above earth's surface, value of "g" is same as in a 100 km deep mine?
18. Find an expression for the gravitational potential energy of a body situated at a distance "r" from the centre of earth.
19. At what distance from the mean position is kinetic energy equal to potential energy? Briefly explain in case of S.H.M.

SECTION-D

(Long Answer Type Questions)

(5 marks each)

20. What do you mean by resolution of a vector? Find rectangular components of a vector.

OR

From the **velocity-time** graph of uniform accelerated motion, deduce the equations of motion in

- (i) Velocity and time (ii) Position and time

~~21.~~ What do you mean by terminal velocity? Derive an expression for it.

OR

Explain modes of transfer of heat with example.

~~22.~~ Discuss the harmonics in the case of open end organ pipes.

OR

Derive an expression for velocity and acceleration of a particle executing simple harmonic motion.

Roll No.

Z-8-A

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208-A

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

Section-A

(Objective Type Questions)

1 each

1. (i) Which of the following is not the unit of surface tension ?

(A) N/m

(B) J/m²

(C) kg/s²

(D) N/m²

(ii) The numbers 2.745 and 2.735 on rounding off to 3 significant figures

will give :

(A) 2.75 and 2.74

(B) 2.74 and 2.73

(C) 2.75 and 2.73

(D) 2.74 and 2.74

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208-A

Turn Over

Z-8-A

(iii) When the distance travelled by a body is proportional to the time taken, what happens to its speed ?

- (A) Becomes zero
- (B) Increases
- (C) Remains the same
- (D) Decreases

(iv) If a projectile is thrown with velocity u at an angle θ with the horizontal, then velocity at maximum height during projectile motion will be :

- (A) $u \sin \theta$
- (B) $2u \sin \theta$
- (C) $2u \cos \theta$
- (D) $u \cos \theta$

(v) The forward movement in swimming takes place because of :

- (A) First law of motion
- (B) Second law of motion
- (C) Third law of motion
- (D) Fourth law of motion

- (vi) The maximum value of static friction when the body is at the verge of starting motion is known as :
- (A) Impending motion
 - (B) Angle of repose
 - (C) Static friction
 - (D) Limiting friction
- (vii) Linear velocities of all the particles of the rigid body in rotational motion is :
- (A) One
 - (B) Zero
 - (C) Same
 - (D) Different
- (viii) At what depth below the surface of earth the value of ' g ' is same as that of height of 5 km ?
- (A) 10 km
 - (B) 7.5 km
 - (C) 5 km
 - (D) 2.5 km

(4)

(ix) The heat transfer in the light bulb takes place due to :

- (A) Conduction
- (B) Convection
- (C) Radiation
- (D) Both convection and radiation

(x) What is the value of Avogadro's constant ?

- (A) $6.022 \times 10^{23} \text{ mol}^{-1}$
- (B) $6.022 \times 10^{26} \text{ mol}^{-1}$
- (C) $6.022 \times 10^{25} \text{ mol}^{-1}$
- (D) $6.022 \times 10^{22} \text{ mol}^{-1}$

Section-B

(Very Short Answer Type Questions)

2 each

2. (a) From the velocity-time graph of uniform accelerated motion, deduce the equation of motion in velocity and time.
- (b) State the conditions for the equilibrium of a particle under concurrent forces.

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208-A

Z-8-A

- (c) A force of 50 N acts on a body and moves it to a distance of 4 m on a horizontal surface. Calculate work done if the direction of force is at an angle of 60° to the horizontal surface.
- (d) Give two points of difference between conservative and non-conservative forces.
- (e) What is Collision ? Define two types of collision.
- (f) A torque of 20 N-m is applied on a wheel initially at rest. Calculate angular momentum of the wheel after 3 seconds.
- (g) State universal law of gravitation. Derive relation between ' g ' and ' G '.
- (h) State law of equipartition of energy. Also give the concept of mean free path.
- (i) Why longitudinal waves are called pressure waves ?

Section-C

(Short Answer Type Questions)

3 each

3. (a) If string wires of same material of length l and $2l$ vibrate with frequencies 100 Hz and 150 Hz, find the ratio of their tensions.
- (b) Find the dimensions of Planck's constant. If its value in CGS system is 6.62×10^{-27} erg-sec. What will be its value on MKS system ?
- (c) Why are the curved roads banked ? Find the angle of banking of curved road. <https://www.jkboseonline.com>
- (d) State and explain the principle of conservation of angular momentum.
- (e) Define orbital velocity. Derive an expression for it.
- (f) State and explain Hooke's law.
- (g) Define Thermal Equilibrium. How does it occur ? What is the relationship between thermal equilibrium and zeroth law ?

- (h) State second law of thermodynamics by Kelvin and Clausius. Give two applications of second law of Thermodynamics.
- (i) Show that average kinetic energy of translation per molecule of gas is directly proportional to the absolute temperature of gas.

Section-D

(Long Answer Type Questions)

5 each

4. (a) Show that the path followed by projectile is parabolic when it is projected at an angle θ with horizontal.

Or

Explain cross product of vectors. Give its example and properties.

- (b) State and prove Bernoulli's theorem. Give its applications.

Or

Define Capillarity. Derive ascent formula for the rise of a liquid in a capillary tube and discuss the result obtained.

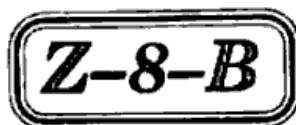
(8)

- (c) What are Standing Waves ? Explain their formation in open organ pipe.

Or

Show that the total energy of particles performing linear simple harmonic motion is constant. What is the time period of total energy in SHM ?

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Total No. of Questions : 4]

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208-B

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

Section-A

(Objective Type Questions)

1 each

1. (i) Which two of the following four physical parameters have same dimensions ?

(i) Energy density

(ii) Refractive index

(iii) Dielectric constant

(iv) Young's modulus

(A) (ii) and (iv)

(B) (iii) and (iv)

(C) (i) and (iii)

(D) (i) and (iv)

- (ii) The number of significant figures in 2.64×10^{27} kg is :

(A) 1

(B) 3

(C) 4

(D) 5

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Z-8-B

208-B

Turn Over

(iii) Which is the formula for motion in straight line ?

(A) $v = u + at$

(B) $u = 2at + v$

(C) $v = u - at$

(D) $v = 2at + u$

(iv) To take the longest possible jump, an athlete should make an angle with horizontal :

(A) 90°

(B) 60°

(C) 45°

(D) 30°

(v) Which law of Newton helps in finding the force on a body ?

(A) First law

(B) Second law

(C) Third law

(D) None of these

(vi) Limiting friction of a body depends on :

- (A) Area of contact of surfaces
- (B) Volume of smaller body on larger surface
- (C) The periphery of the contact surfaces
- (D) Nature of surfaces

(vii) Centre of mass of an isolated system has a :

- (A) Increasing velocity
- (B) Decreasing velocity
- (C) Constant velocity
- (D) Variable velocity

(viii) When a missile is launched with a velocity less than the escape velocity, the sum of kinetic and potential energy is :

- (A) Zero
- (B) Negative
- (C) Positive
- (D) Infinite

- (ix) What kind of transfer of heat involves while you boil water in the pot ?
- (A) Evaporation
 - (B) Conduction
 - (C) Convection
 - (D) Radiation
- (x) The S.I. unit of Avogadro's constant is :
- (A) mol
 - (B) gram
 - (C) mol^{-1}
 - (D) pascal

Section-B

(Very Short Answer Type Questions)

2 each

2. (a) From the velocity-time graph of uniform accelerated motion, deduce the equation of motion in distance and time.

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Z-8-B

208-B

- (b) Deduce the relation $F = ma$ from second law of motion.
- (c) An elevator weighing 750 kg is to be lifted up at constant velocity of 0.3 m/s. What should be the minimum horse power of the motor to be used ?
- (d) Define power and energy. Give their units.
- (e) What is Collision ? Define two types of collision.
- (f) A torque of 20 N-m is applied on a wheel initially at rest. Calculate angular momentum of the wheel after 3 seconds.
- (g) State universal law of gravitation. Derive relation between 'g' and 'G'.
- (h) State law of equipartition of energy. Also give the concept of mean free path.
- (i) Why longitudinal waves are called pressure waves ?

Section-C

(Short Answer Type Questions)

3 each

3. (a) A particle executes SHM with an amplitude of 13 cm and its velocity at a distance of 5 cm from equilibrium position is 36 cms^{-1} . Determine the maximum value of the restoring force. Mass of the particle is 3 g.
- (b) Find the dimensions of Planck's constant. If its value in CGS system is $6.62 \times 10^{-27} \text{ erg-sec}$. What will be its value on MKS system ?
- (c) Why are the curved roads banked ? Find the angle of banking of curved road.
- (d) State and explain the principle of conservation of angular momentum.
- (e) Define orbital velocity. Derive an expression for it.
- (f) State and explain Hooke's law.
- (g) Define Thermal Equilibrium. How does it occur ? What is the relationship between thermal equilibrium and zeroth law ?

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Z-8-B

208-B

- (h) State second law of thermodynamics by Kelvin and Clausius. Give two applications of second law of Thermodynamics.
- (i) Show that average kinetic energy of translation per molecule of gas is directly proportional to the absolute temperature of gas.

Section-D

(Long Answer Type Questions)

5 each

4. (a) Show that the path followed by projectile is parabolic when it is projected at an angle θ with horizontal. <https://www.jkboseonline.com>

Or

Explain cross product of vectors. Give its example and properties.

- (b) State and prove Bernoulli's theorem. Give its applications.

Or

Define Capillarity. Derive ascent formula for the rise of a liquid in a capillary tube and discuss the result obtained.

(8)

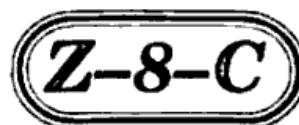
(c) What are Standing Waves ? Explain their formation in open organ pipe.

Or

Show that the total energy of particles performing linear simple harmonic motion is constant. What is the time period of total energy in SHM ?

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Z-8-B

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11th ARF(SZ)JKUT2024-25

208-C

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

Section-A

(Objective Type Questions)

1 each

1. (i) The physical quantities not having same dimensions are :

(A) Momentum and Planck's constant

(B) Speed and $(\mu_0 \epsilon_0)^{-1/2}$

(C) Speed and $\sqrt{P/\rho}$

(D) Surface tension and spring constant

(ii) The number of significant figures in 0.2370 is :

(A) 1

(B) 3

(C) 4

(D) 5

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208-C

Turn Over

Z-8-C

- (iii) Which among the following can be zero when a particle is in motion for some time ?
- (A) Displacement
 - (B) Speed
 - (C) Distance
 - (D) None of these
- (iv) The path traced by a projectile in space is known as :
- (A) Track
 - (B) Orbit
 - (C) Trajectory
 - (D) Coral
- (v) Which one of the following is not an example of the third law of motion ?
- (A) Walking
 - (B) Cycling
 - (C) Skiing
 - (D) Walking on a boat

(vi) Which of the following is self adjusting force ?

- (A) Kinetic friction
- (B) Limiting friction
- (C) Static friction
- (D) All of these

(vii) A body in rotational motion possesses rotational kinetic energy given by :

- (A) $\frac{1}{2}I\omega^2$
- (B) $\frac{1}{2}I^2\omega$
- (C) $2 I^2\omega$
- (D) $I\omega$

(viii) Which law describes the orbits of planets around the sun ?

- (A) Newton's law
- (B) Kirchhoff's law
- (C) Faraday's law
- (D) Kepler's law

(ix) Wien's law is :

(A) $\lambda_m T^{-1} = \text{constant}$

(B) $\lambda_m T = \text{constant}$

(C) $\frac{\lambda_m}{T}$ is constant

(D) $\frac{\lambda_m}{\sqrt{T}} = \text{constant}$

(x) How many number of particles are in 22.4 litres of any gas at S.T.P. ?

(A) 6.02×10^{22}

(B) 2.06×10^{23}

(C) 6.02×10^{23}

(D) 2.06×10^{22}

Section-B

(Very Short Answer Type Questions)

2 each

2. (a) From the velocity time graph of uniform accelerated motion, deduce the equation of motion in distance and velocity.
- (b) Explain the term impulse. Give *one* example.

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Z-8-C

208-C

- (c) A force $F = (10 + 0.50x)$ acts on a particle in x direction, where F is in newton and x is in metre. Find the work done by this force during a displacement from $x = 0$ to $x = 2$ m.
- (d) How do potential energy of a spring vary with displacement ?
- (e) What is Collision ? Define two types of collision.
- (f) A torque of 20 N-m is applied on a wheel initially at rest. Calculate angular momentum of the wheel after 3 seconds.
- (g) State universal law of gravitation. Derive relation between ' g ' and ' G '.
- (h) State law of equipartition of energy. Also give the concept of mean free path.
- (i) Why longitudinal waves are called pressure waves ?

Section-C

(Short Answer Type Questions)

3 each

3. (a) The amplitude of a particle executing SHM is 0.1 m. The acceleration of the particle at a distance of 0.03 m from equilibrium position is 0.12 m/s^2 . What will be its velocity at a distance of 0.08 m from position of equilibrium ?
- (b) Find the dimensions of Planck's constant. If its value in CGS system is $6.62 \times 10^{-27} \text{ erg-sec}$. What will be its value on MKS system ?
- (c) Why are the curved roads banked ? Find the angle of banking of curved road. <https://www.jkboseonline.com>
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- (i) Show that average kinetic energy of translation per molecule of gas is directly proportional to the absolute temperature of gas.

Section-D

(Long Answer Type Questions)

5 each

- (a) Show that the path followed by projectile is parabolic when it is projected at an angle θ with horizontal.

Or

Explain cross product of vectors. Give its example and properties.

- (b) State and prove Bernoulli's theorem. Give its applications.

Or

Define Capillarity. Derive ascent formula for the rise of a liquid in a capillary tube and discuss the result obtained.

Turn Over

(8)

- (c) What are Standing Waves ? Explain their formation in open organ pipe.

Or

Show that the total energy of particles performing linear simple harmonic motion is constant. What is the time period of total energy in SHM ?